Question A1: Components for Networking Applications

1) What are the main trends in semiconductor electronics and particular in integrated circuits?

2a) What technologies and semiconductor materials are used to manufacture integrated circuits for communications applications?

2b) What types of fibers are used in optical communications?

3a) How the transmission windows of standard single-mode fiber are defined?

3b) Are there any new fiber types and what are the trends in optical communications?

4a) Draw the schematic of an erbium-doped fiber amplifier (EDFA).

4b) Are there any other optical amplifiers that can be used in fiber communications?

4c) Describe the operational principle of these optical amplifiers and in which applications they can be used.

Question A2: Interconnects and Systems

1a) How interconnects can be classified?

1b) Compare at least three typical interconnection solutions with each other regarding physical specification of signal transmission, structure, addressing method, flexibility, applications, transaction overhead or transmission efficiency.

2a) What is Internet SCSI (iSCSI)?

2b) Describe encapsulation of storage data into TCP/IP packets by using the iSCSI protocol

3a) There are three options for implementing iSCSI host bus adapters (HBA). Describe these implementation options.

3b) What option can provide the highest performance?

4a) Draw a block diagram of the 10GBASE-R (10 Gigabit Ethernet) physical coding sublayer (PCS).

4b) Describe the main functions of the blocks.

4c) What coding scheme is used in 10GBASE-R? 64b/66b

5a) Describe SONET/SDH interfaces developed by the Optical Internetworking Forum (IOF).

5b) What are the main differences between System Packet Interface (SPI) and DERDES Frame Interface (SFI)?

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Question B1: Networking

1) Explain why there exist four address fields in the IEEE 801.11 WLAN frame format. Remark: Consider the different communication possibilities between the involved network elements.
2) What is the difference between a peer- and a overlay model in VPNs?
3) Which frame field distinguishes between group members in a VLAN?
4) Which two signaling protocol families exist in IP networks.
5) Acronyms: VPN and VLAN.

Question B2: Circuit-Switching

1) Give three major difference between SDH and OTN.
2) How are PHD- and packet-technologies principally mapped onto SDH?
3) Which functionality does LCAS provide?
4) What is inverse multiplexing and what is the term in Ethernet?
5) Which units can be labelled by GMPLS.
6) Acronyms: OTN and LCAS.

Question B3: Packet-Switching

1) Give the architecture of super-high-speed Routers.
2) Give the architecture and network components of GPRS.
3) Give the architecture and network components of IMS.
4) Give the architecture and properties of RPR.
5) Acronyms: GPRS, IMS, and RPR.

Question B4: Wireless Access

1) What are the characteristics of FDD and TDD in UMTS?
2) Which channel groups (no individual channels) do exist in GSM?
3) Mention three characteristics of WiMax?
4) For which network environment MBMS has been developed?
5) what are the duplex modes of WLAN and WiMax?
6) Acronyms: WiMax and MBMS.

Question B5: Wired Access

1) Give the properties of a V.90/92 modem.
2) Give the transmission principle and data formating principle of xDSL.
3) Give the transmission and access principles of APON and EPON.
4) Which access system uses the standard DOCSIS?
5) Acronyms: APON, EPON, and DOCSIS.